

**COURSE DATA****DATA SUBJECT****Code:** 33148**Name:** Human physiology**Cycle:** Undergraduate Studies**ECTS Credits:** 7.5**Academic year:** 2026-27**STUDY (S)**

Degree	Center	Acad. year	Period
1109 - Degree in Biochemistry and Biomedical Sciences	Facultat de Ciències Biològiques	3	Second quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1109 - Degree in Biochemistry and Biomedical Sciences	Integración fisiológica y fisiopatológica	COMPULSORY

COORDINATION

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SUMMARY

The subject HUMAN PHYSIOLOGY is part of the art "Physiological and pathophysiological integration" in the degree of Biochemistry and Biomedical Sciences of the University of Valencia and it is located in the third year. It consists of 7.5 ECTS credits (187.5 hours of student work), which include face-to-face and remote activities. This is a subject of synthesis, in which the students should understand the functional relationships between the different parts of the human being as well as coordination actions that occur between them, and which are necessary for its operation as a whole.

PREVIOUS KNOWLEDGE**RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE**

There are no specified enrollment restrictions with other subjects of the curriculum.

OTHER REQUIREMENTS

In previous years, the students will have acquired the basic skills needed to meet the objectives of the course. Subjects such as "Physics", "Chemistry", "Cell Organization", "Intracellular dynamics and signaling" and "Functional histology", as well as others that are taught in the first quarter of the course, as



"Metabolism and regulation" are fundamental in the acquisition of basic background knowledge, crucial to understand the functioning of human body.

COMPETENCES / LEARNING OUTCOMES

1101 -

Comprender el funcionamiento del animal como un todo integrado reforzando el papel de los sistemas de coordinación e integración.

Conocimiento de la organización estructural y funcional de los tejidos y órganos animales.

DESCRIPTION OF CONTENTS

1. INTRODUCTION

ITEM 1. INTRODUCTION TO PHYSIOLOGY. Physiological systems.- Functions and processes.- Homeostasis and pathophysiology.- Functional compartments of the body.- The integrative physiology as a science. Long-distance communication: neural signals, hormones and neurohormones.- Control pathways: response and feedback loops.- Reflex control.

2. HOMEOSTASIS AND CONTROL

ITEM 2. INTRODUCTION TO THE ENDOCRINE SYSTEM. Hormones.- Classification.- Control of hormone release: hypothalamic-pituitary system.- Hormone interactions.

ITEM 3. INTRODUCTION TO THE NERVOUS SYSTEM. Organization of the nervous system.- Electrical signals in neurons.- Intercellular communication synapse.- Integration of neural information.

ITEM 4. THE CENTRAL NERVOUS SYSTEM. White matter vs. gray matter.- Cerebrospinal fluid.- The spinal cord.- Nervous function: the brain stem, the cerebellum, the diencephalon, the cerebrum.- The cerebral cortex and its functional areas: sensory and motor integration.

ITEM 5. SENSORY PHYSIOLOGY. General properties of sensory systems.- Somatic senses.- Chemoreception: Smell and taste.- Mechanoreception: hearing and equilibrium.- Photoreception: the eye and vision.

ITEM 6. SOMATIC AND AUTONOMIC CONTROL. The autonomic nervous system.- Autonomic reflexes. - Functional Anatomy: sympathetic-parasympathetic division.- Autonomic Neurotransmitters.- The somatic motor division: functional anatomy.- The neuromuscular junction.



ITEM 7. MUSCLE PHYSIOLOGY. Isometric and isotonic contraction. Nervous control of skeletal muscle. Neural reflexes. Autonomic reflexes. Skeletal muscle reflexes. Integrated control of body movement.

3. INTEGRATION OF FUNCTION

ITEM 8. RESPIRATORY PHYSIOLOGY. Functional anatomy of the respiratory system.- Lung volumes.- Ventilation: inspiration and expiration.- Surfactant.- Efficiency of breathing.

ITEM 9. GAS EXCHANGE AND TRANSPORT. Gas exchange in the lungs and tissues.- Transport of blood gases: oxygen and carbon dioxide.- Regulation of ventilation.- Respiratory pathophysiology.

ITEM 10. CARDIOVASCULAR PHYSIOLOGY. Overview of the cardiovascular system.- Functional anatomy of the heart: the cardiac action potential.- Electrical conduction in the heart: cardiac cycle.- Cardiac Output.- Nervous and endocrine control of heart activity.

ITEM 11. BLOOD PRESSURE AND BLOOD FLOW. The blood vessels.- Blood Pressure.- Resistance in the arterioles.- Exchange at the capillaries.- Lymphatic system.- Regulation of blood pressure.- Cardiovascular disease.

ITEM 12. RENAL FUNCTION. Functional anatomy of the kidney.- Overview of kidney function: filtration, reabsorption, secretion.- Micturition.

ITEM 13. FLUID AND ELECTROLYTE BALANCE. Water balance: the role of the loop of Henle.- Control of water balance.- Control of salt balance: renin-angiotensin-aldosterone system and other hormones.- Integrated control of volume and osmolarity.

ITEM 14. ACID-BASE BALANCE. Importance of homeostasis.- Buffer systems.- Control of pH by ventilation.- Kidney control of acid-base balance.

4. METABOLISM AND GROWTH

ITEM 15. REGULATION OF BODY TEMPERATURE: heat production and loss by the body. Response to high and low temperatures. Physiological and pathological reconfiguration of the hypothalamic thermostat.

ITEM 16. DIGESTIVE PHYSIOLOGY. Functional anatomy of the digestive system.- Gastrointestinal motility.- Digestive secretions.- Regulation of digestive function: role of the nervous and endocrine systems.- Cephalic, gastric and intestinal phases of digestion.- Absorption.

ITEM 17. ENDOCRINE CONTROL OF GROWTH AND METABOLISM. Homeostatic control of nutrient metabolism: insulin-glucagon relationships.- Diabetes.- Adrenal glucocorticoid: functions and control of secretion.- Response to stress.- Growth hormone: functions and control of secretion.- Thyroid hormones: functions and control of secretion.- Tissues and bone growth: Hormonal control of calcium homeostasis



ITEM 18. ENDOCRINE CONTROL OF REPRODUCTION. Basic patterns of reproduction: gametogenesis.- Male reproduction: hormonal control of spermatogenesis.- Female reproduction: hormonal control of the menstrual cycle.- Sexual response in humans.- Pregnancy, parturition and lactation.

5. LABORATORY AND SIMULATION PRACTICES

Effect of temperature on the oxygen consumption of aquatic animals.

Study of sensory receptors in humans.

Electromyography (BIOPAC Student System). Electrocardiography.

Human blood pressure study.

Spirometry Analysis of lung volumes and capacities.

In situ observation of chloride cells in Artemia.

Study of the estrous cycle in the albino mouse.

Anatomical-functional study of the heart.

Pancreatic function: endocrine pancreas and glycemia. Exocrine pancreas and digestion.

6. TUTORIAL SESSIONS

They will be planned throughout the course, lasting one or two hours and in them, activities focused on the pathophysiological aspects will be proposed to the students, such as solving practical cases after providing them information on specific symptoms, as well as activities of problem solving.

7. JOURNAL CLUB

Critical analysis of scientific articles (transversal activity) carried out jointly with the rest of the subjects of the same course.

**WORKLOAD****PRESENCIAL ACTIVITIES**

Activity	Hours
Tutorials	6,00
Theory	48,00
Laboratory	21,00
Total hours	75,00

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	11,00
Independent study and work	15,00
Preparation of lessons	42,00
Preparation for assessment activities	44,50
Resolution of case studies	0,00
Total hours	112,50

TEACHING METHODOLOGY

The teaching methodologies of the different activities (face-to-face and non-face-to-face) are described here.

Lecture-style theory classes, which give the lecturer the opportunity to focus on the key concepts needed to understand the topic. In some topics, a participatory model will be used, prioritising communication among students and with the lecturer. These will be delivered sequentially throughout the academic year, so that they are integrated with the rest of the proposed activities

Laboratory practical classes. In these classes, knowledge of human physiology will be applied in a practical and direct way. Students will also acquire the skills needed to work effectively in the laboratory. The total number of in-person laboratory hours is divided into 7 sessions of three hours each. In each session, students, working in pairs, carry out the proposed activities after having read the instructions provided beforehand.

Tutorials. During the 6 hours of tutorials, interactive activities (individual or group) will be proposed, aimed at learning through exercises and problems. Solving exercises or practical cases and class discussion will help consolidate the subject's competences. These topics may be assessed in the theoretical assessment tests. Attendance, attitude and engagement may also be assessed in this activity.



Journal Club

Critical analysis of scientific articles: the activity allows students to acquire transversal competences, different from those acquired in theoretical and practical sessions. This activity aims to train the student in reading scientific papers (which necessarily implies reading in technical English), bringing them closer to the original scientific literature. This is the source from which new knowledge is obtained and allows the development and advancement of biomedical sciences. This compulsory activity will be organized jointly with the rest of the third-year subjects. According to the number of credits of each subject from 3 to 6 articles will be analysed. The preparation, presentation and debate (for 30 minutes) of the articles will be carried out in groups of 2 students and will be supervised by the teacher through tutorial sessions.

EVALUATION

The final grade is obtained from four blocks. Passing the theory and practicals blocks (a minimum of 50 out of 100 points in both theory and practicals) is a necessary condition for the grades to be added together. Otherwise, the subject will be failed, even if the average grade is a pass.

Theory 60%

2 mid-term exams

- Written multiple-choice test (50%)
- Short reasoning questions (50%)

Practicals 30%

- Laboratory practical exam (20%): execution, skill, attitude...
- Written multiple-choice test (10%)

Tutorials 5%

- Assessment of tutorial sessions: attitude, skills, oral communication...

Journal Club 5%

- Comprehension, terminology, oral communication skills



FIRST EXAM PERIOD

Theory assessment (60%)

In the first exam period, theory will be assessed through two tests containing different types of questions (reasoning, definitions, diagrams, etc.) and multiple-choice questions. The grade for both tests may be averaged from a score of 4 upwards, and if the student fails, they must sit the second exam period, with the partial grades from 4 upwards being kept.

Practical assessment (30%)

The laboratory practical exam will be held, consisting of:

- Resolution of two practical scenarios "on the spot".
- Multiple-choice questionnaire on the laboratory sessions.

Tutorial assessment (5%)

Attendance, attitude, skills and oral communication may be assessed.

Critical analysis of scientific articles (Journal Club) (5%)

For the assessment of this activity, the following evaluation criteria will be taken into account: knowledge and understanding of the information contained in the articles, correct use of terminology and oral communication skills. Integration with other theoretical and practical content from this or other degree subjects may also be assessed. A maximum score of 10 points may be obtained, with 5 points required to pass this activity. The grade obtained will represent 5% of the final grade for each of the third-year subjects

SECOND EXAM PERIOD

If the minimum score is not reached in one of the two blocks (theory or practicals), the grade for the other block may be kept for a full academic year. The grades for tutorials and the Journal Club will also be kept.

The second exam period for the theoretical part will consist of a single exam with multiple-choice questions and reasoning questions.

The practical exam in the second exam period will be similar to that of the first exam period.

In the second exam period, passing the theory and practicals blocks (a minimum of 50 out of 100 points in both theory and practicals) remains a necessary condition for the grades to be added together.

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